

WHAT IS CLAIMED IS:

1. An ink cartridge for use with a recording apparatus which supplies ink to a recording head by application of pressurized air produced by an air pressurization pump, the ink cartridge  
5 comprising:

an outer shell member constructed at least by a first outer shell constituent member and a second outer shell constituent member that are hermetically coupled together;

an ink pack of flexible material storing ink therein, the  
10 ink pack being housed within the outer shell; and

a pressure chamber defined between the outer shell member and the ink pack and adapted to receive the pressurized air produced by the air pressurization pump.

2. The ink cartridge according to claim 1, wherein the first  
15 outer shell constituent member and the second outer shell constituent member are hermetically coupled together by vibratory welding.

3. The ink cartridge according to claim 2, wherein a  
20 continuous, substantially planar weld surface is formed over the entirety of a peripheral edge of a lower case forming the first outer shell constituent member, and a continuous director is formed on a peripheral edge of an upper case forming the second outer shell constituent member to be frictionally welded upon

contact with the weld surface.

4. The ink cartridge according to claim 3, wherein an upright flange section is integrally formed on the peripheral edge of a lower case forming the first outer shell constituent member, along an outer periphery of the weld surface.

5. The ink cartridge according to any one of claims 1 through 4, wherein reinforcement ribs are formed on surfaces of the first and second outer shell constituent members, the surfaces at least partially defining the pressure chamber.

6. The ink cartridge according to claim 1, wherein the first outer shell constituent member and the second outer shell constituent member are hermetically coupled together by heat-welding.

7. The ink cartridge according to claim 6, wherein a continuous, substantially planar weld surface is formed over the entirety of a peripheral edge of a lower case forming the first outer shell constituent member, and a heat-welding film forming the second outer shell constituent member is thermally welded to the weld surface.

8. The ink cartridge according to claim 7, further comprising a reinforcement member which covers an outside of the heat-welding film.

9. The ink cartridge according to claim 8, wherein an

engagement section removably engaging the peripheral edge of the lower case is formed integrally on a peripheral edge of the reinforcement member.

10. The ink cartridge according to any one of claims 6 through 9, wherein reinforcement ribs are formed on the surface of the first outer shell constituent member, the surface at least partially defining the pressure chamber.

11. The ink cartridge according to claim 1, wherein a first continuous, closely contactable surface is formed over the entirety of a peripheral edge of a lower case forming the first outer shell constituent member; a second closely contactable surface is formed on a peripheral edge of a cover forming the second outer shell constituent member to be brought into close contact with the first closely contactable surface; and an engagement section removably engaging the peripheral edge of the lower case is formed integrally on the cover, the engagement section maintaining the case and the cover in a sealed state.

12. An ink cartridge constructed so as to supply ink to a recording head by receiving pressurized air produced by an air pressurization pump, comprising:

an outer shell member;

an ink pack of flexible material storing ink therein, the ink pack being housed in the outer shell member;

a pressure chamber defined between the outer shell member and the ink pack, and adapted to receive the pressurized air produced by the air pressurization pump;

5 a pressurized air inlet port provided to the outer shell member, wherein the pressurized air supplied from the air pressurization pump is introduced to the pressurized air inlet port; and

an ink outlet section which is provided to the ink pack, and which enables outflow of ink from the ink pack;

10 wherein, when the ink cartridge is removed from a recording apparatus, the pressurized air inlet port is released, to thereby bring the pressure chamber in communication with the atmosphere, and the ink outlet section is brought into a closed state.

13. The ink cartridge as defined in claim 12, wherein the  
15 pressurized air inlet port is formed integrally with the outer shell member, and includes a cylindrical member which defines an air channel communicating with the pressure chamber.

14. The ink cartridge as defined in claim 12, wherein the  
20 ink outlet section has a valve member, wherein, when the ink cartridge is mounted a recording apparatus, the valve member comes into contact with a connection section of the recording apparatus and recedes in an axial direction, thus becoming open; and wherein, when the ink cartridge is removed from the recording apparatus,

the valve member advances in the axial direction, thus sustaining a closed state.

15. The ink cartridge as defined in claim 14, wherein the ink outlet section has a spring member for urging the valve member so as to advance in the axial direction.

16. The ink cartridge as defined in any one of claims 12 through 15, wherein the ink outlet section is exposed to the outside of the outer shell member by way of an opening section formed in the outer shell member, wherein an O-ring is interposed between the opening section and the ink outlet section, and wherein an engagement member is provided for establishing a sealed state between the opening section and the ink outlet section by pressing the O-ring.

17. An ink cartridge for use with a recording apparatus, including: an ink pack of flexible material storing ink therein, and a cartridge case hermetically formed for housing the ink pack, wherein, when the ink cartridge is mounted to a recording apparatus, pressurized air is introduced into the cartridge case, the ink cartridge comprising:

first and second cases which constitute the cartridge case; a flange section formed along an edge of an opening of the first case; and

at least one lug-shaped member which is formed on the second

case and engages with the flange section, thereby coupling the first and second cases together.

18. The ink cartridge according to claim 17, wherein, after the ink pack is housed in the first case, the edge of the opening  
5 of the case is sealed by a film member, thereby realizing a sealed state, and wherein the second case functions as a cover for preventing expansion of the film member when the film member receives the pressurized air.

19. The ink cartridge according to claim 17, wherein a tapered  
10 surface and an engagement step section are formed on the lug-shaped member such that, when the second case is attached to the first case, the flange section is relatively guided by and along the tapered surface to engage with the engagement step section.

20. The ink cartridge according to claim 17, wherein the  
15 second case is formed from a planar section acting as a cover and a fold section formed integral with and perpendicular to the planar section, and the lug-shaped member is formed on an interior surface of the fold section.

21. The ink cartridge according to claim 20, wherein a  
20 plurality of independent lug-shaped members are intermittently formed on the interior surface of the fold section.

22. The ink cartridge according to claim 21, wherein slit holes are formed through the planar section of the second case

to correspond in location to the plurality of independent lug-shaped members, and to be elongated along the fold section.

23. The ink cartridge according to any one of claims 18 through 22, wherein a film member is sealed to the edge of the opening of the first case by heat welding.

24. An ink cartridge for use with a recording apparatus, including an ink pack of flexible material storing ink therein, and a cartridge case which houses the ink pack and constitutes an outer shell, the ink cartridge comprising:

an ink pack press member which is housed in the cartridge case along with the ink pack and which adjusts the volume of ink to be filled into the ink pack in accordance with the volume of the press member.

25. The ink cartridge according to claim 24, wherein the ink pack is formed into a substantially rectangular shape and into a bag by sealing four sides of the ink pack; wherein the press member housed in the cartridge case along with the ink pack is formed into a frame shape having an window opening in a central portion thereof; and wherein the four sides of the ink pack are pressed by the frame-shaped press member.

26. The ink cartridge according to claim 25, wherein parts of the press member opposing the four sides of the ink pack are gradually reduced in thickness toward the window opening to define

slope surfaces.

27. The ink cartridge according to claim 26, wherein the slope surfaces are curved.

28. The ink cartridge according to claim 24, wherein the press member is formed from resilient material.

29. The ink cartridge according to any one of claims 24 through 28, wherein the cartridge case is hermetically formed; and wherein, as pressurized air is introduced into the case when the ink cartridge is mounted to the recording apparatus, the ink pack is pressurized by air pressure.

30. The ink cartridge according to claim 29, wherein the cartridge case includes a first case and a second case; wherein after the ink pack and the press member are housed in the first case, an edge of an opening of the first case is sealed by a film member, thereby realizing a sealed state, and wherein the second case functions as a cover for preventing expansion of the film member when the film member receives the pressurized air.

31. The ink cartridge according to claim 30, wherein at least one lug-shaped member is formed on the second case; and wherein a tapered surface and an engagement step section are formed on the lug-shaped member such that, when the second case is attached to the first case, a flange section formed on the edge of the opening of the first case is relatively guided by and along the



tapered surface to engage with the engagement step section.

32. An ink-jet recording apparatus to which an ink cartridge as defined in any one of claims 1, 12, 17 and 24 can be removably mounted, the recording apparatus comprising:

5       a recording head which is mounted on a carriage and reciprocatingly moved in a widthwise direction of recording paper; and

10       a sub-tank which is replenished with ink from the ink cartridge through an ink supply channel, and supplies the ink to the recording head, wherein

the ink is supplied from the ink cartridge to the sub-tank by application of air pressure to the ink cartridge.

15       33. The ink-jet recording apparatus according to claim 32, wherein the ink supply channel extending from the ink cartridge to the sub-tank is formed from a flexible ink supply tube.

20       34. The ink-jet recording apparatus according to claim 32, wherein an ink supply valve is further provided in the ink supply channel extending from the ink cartridge to the sub-tank, and the ink supply valve is opened or closed in accordance with a control signal produced by ink level detection means for detecting the volume of ink remaining in the sub-tank.

35. The ink-jet recording apparatus according to claim 32, wherein an annular packing member is provided to a cartridge holder

to which the ink cartridge is removably mounted, and, when the ink cartridge is mounted the cartridge holder, the annular packing member comes into close contact with an outer peripheral surface of a cylindrical member which defines an air channel communicating  
5 with a pressure chamber of the ink cartridge.

36. The ink-jet recording apparatus according to claim 32, wherein a cartridge holder to which the ink cartridge is removably mounted is provided with an open/close valve unit which, when the ink cartridge is mounted to the cartridge holder, comes into  
10 contact with an ink outlet section of the ink cartridge and recedes axially, thus becoming open; and wherein, when no ink cartridge is mounted to the cartridge holder, the open/close valve unit advances axially, thus maintaining a closed state.

37. The ink-jet recording apparatus according to claim 36,  
15 wherein the open/close valve unit is provided with a hollow needle having an ink inlet hole, and a slide member; and wherein, when no ink cartridge is mounted to the cartridge holder, the slide member, receiving urging force of a spring member, is moved to a position where the slide member closes the ink inlet hole formed  
20 in the hollow needle.

38. An ink cartridge comprising:

a flexible ink pack storing ink therein and having an ink outlet port normally closed;

an outer shell housing the flexible ink pack and having an air inlet port normally open, the ink outlet port being at least partially exposed outside the outer shell;

5 a sealing member provided between the ink outlet port and the outer shell.

39. The ink cartridge according to claim 38, wherein the outer shell includes first and second members hermetically joined together.

10 40. The ink cartridge according to claim 38, wherein the outer shell includes first and second members joined together by engagement.

41. The ink cartridge according to any one of claims 38 to 40, further comprising:

15 a press member selected from a plurality of press members having respective different volumes, and housed in the outer shell.

42. A combination of an ink cartridge holder, and the ink cartridge of any one of claims 38 to 40, comprising:

20 a pressurized air supply section provided to the holder, and to be connected to and communicated with the air inlet port when the ink cartridge is installed in place in the holder;

an ink receive connection section provided to the holder, and to be connected to and communicated with the ink outlet port

when the ink cartridge is installed in place in the holder.